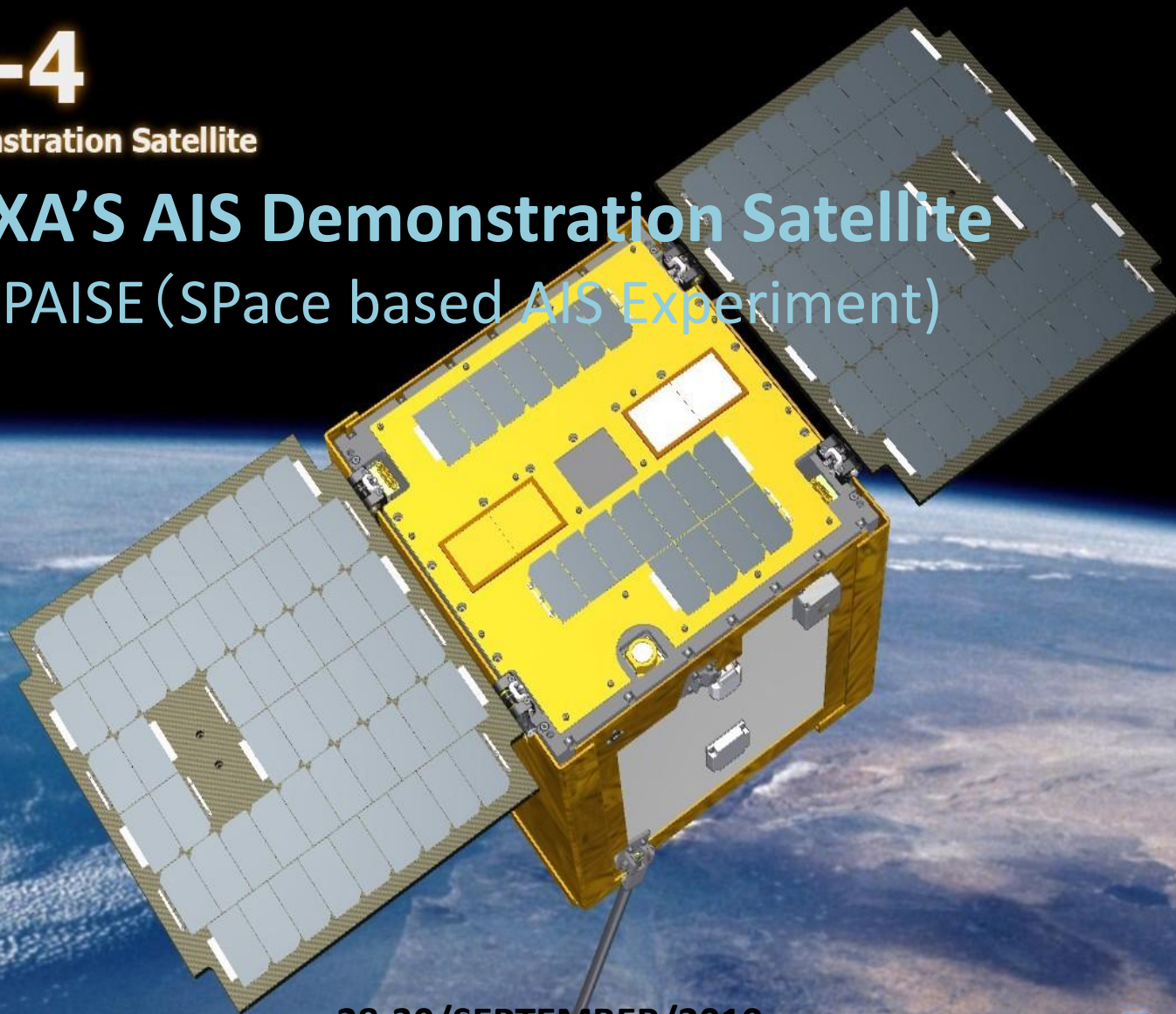


SDS-4

Small Demonstration Satellite

JAXA'S AIS Demonstration Satellite

SPAISE (SPace based AIS Experiment)



28-30/SEPTEMBER/2010

JAXA Space Applications Mission Directorate
Satellite Systems Engineering Group(SSEG)

Suetsugu Shinohara shinohara.suetsugu@jaxa.jp



CONTENTS

1.Introduction

2.Experiment Plan

3.AIS receiving system

4.Experiment Activities

5.SPAISE Ground System

6. Summary

1. Introduction



The necessities of Maritime Surveillance and integrated information systems

1. Safety of marine transportation
2. Environmental monitoring(Oil spill , Polluters)
- 3.Maritime security against Unidentified or suspicious ships
4. Protection of commercial vessels against Piracy
5. Protection of Natural Resources
6. Improvement of Search and Rescue capability

S-AIS is one of the KEY systems which can support MDA activities.

2. Experiment Plan

1. Launch Schedule

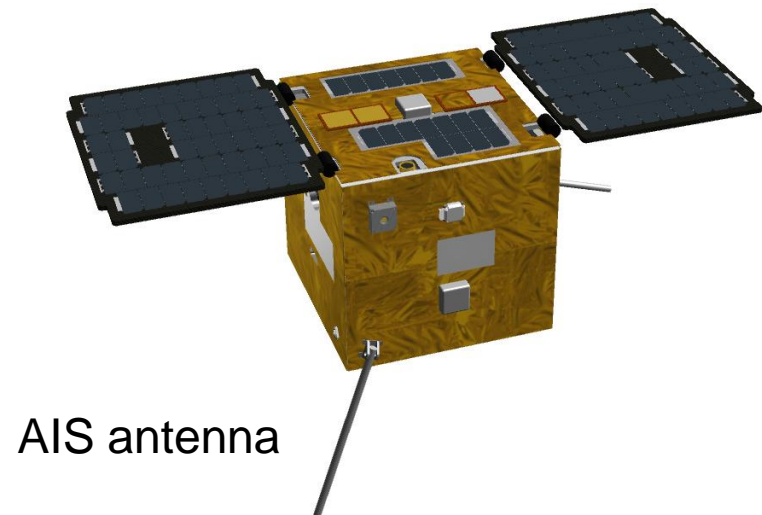
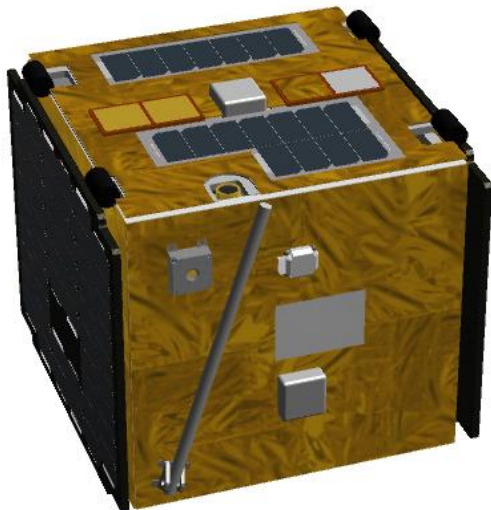
- Nov/2011 H-2A Rocket with GCOM/W1
(Inexpensive piggyback launch : 677KmLEO)

2. Satellite Platform

- 50Kg Class Small Demonstration Satellite(SDS-4)
- Attitude control : Sun pointing(normal) ,Nadir pointing capability
- Mission Payload : AIS ,FOX, QCM, THERME
(FOX: FHP On-orbit Experiment, QCM: Quartz crystal microbalance, THERME: MLI developed by CNES)

3. Experiment Schedule

- Jan/2012 Start to download AIS data and evaluation



3. AIS Receiving System



(1)Physical property

- 2 AIS monopole antennas with deployment mechanism
- Mass : 2.7Kg (include 2 antennas)
- Dimension : 11.5cm × 13cm × 10cm (H)
- Power consumption 8 W

(2)Functional Capabilities

- Decode and store AIS signals (On board)
- Vary central frequency of AIS receiver for Doppler frequency shift
- Digitize AIS signals and download in real-time by S-BAND transmitter (1Mbps)
- Polarization diversity signal receiving by 2 antennas

4.Experimental Activities

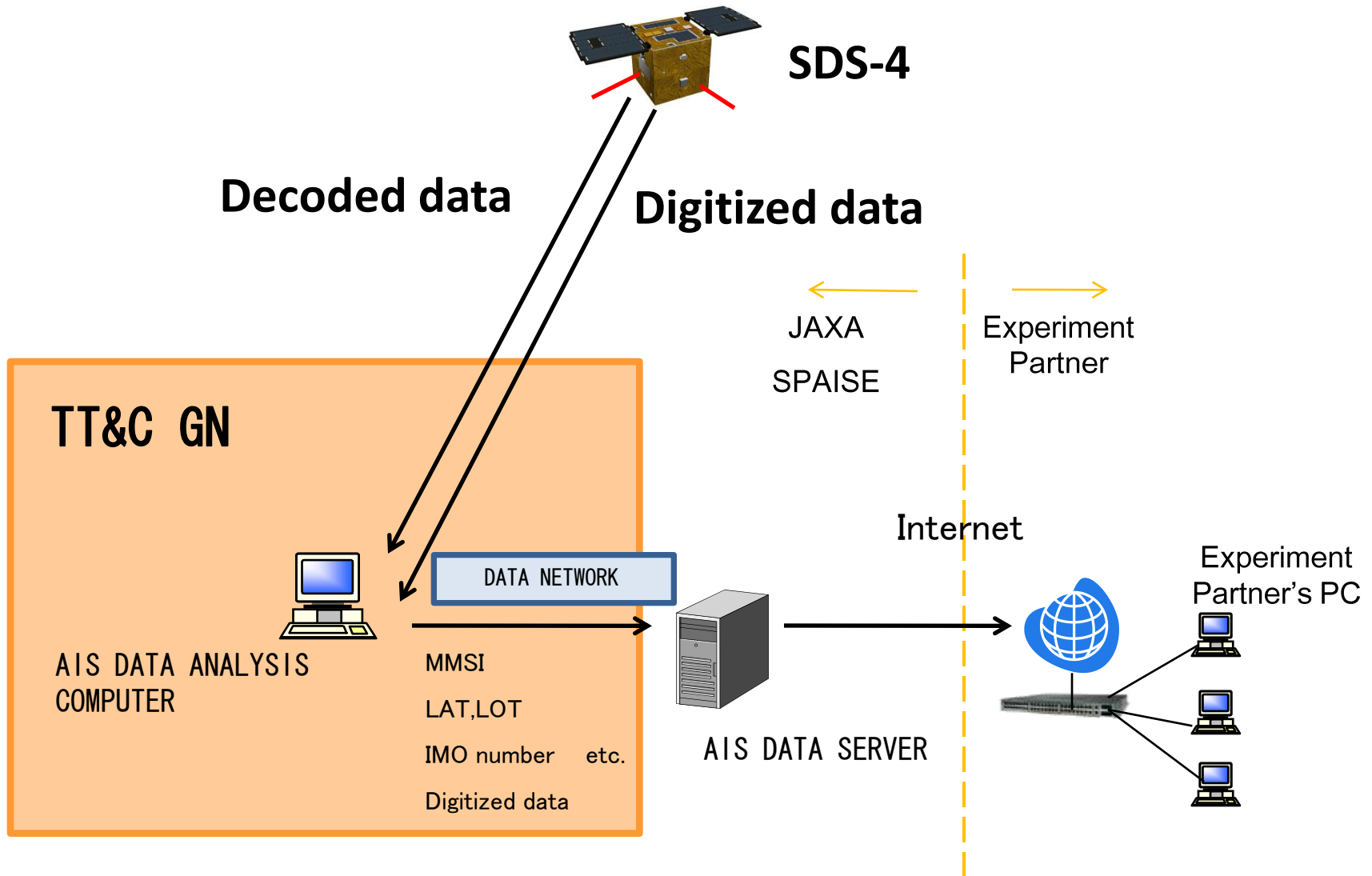
(1)Survey of AIS signal properties

- Spectrums
- Amplitude levels
- frequency of Signals collisions
- Error rate of decoded data
- Environmental effects to AIS signal's error rate (season,weather, etc)

(2)Research of AIS signals analysis

- Signal separation and decode by ground equipments
- On board correlation algorithm

5. SPAISE Ground System



6.Summary

- (1) From 1/2012 We will start to evaluate the performance of AIS receiving system and AIS data.
- (2) JAXA and JCG will cooperate in evaluating AIS data for maritime traffic safety.
- (3) JAXA has a study about applications of AIS potentials with experiment partners.
(e.g. Efficient ship navigation, Data collection ,etc.)
- (4) We will investigate next generation AIS receiver for ALOS series satellites.
- (5) We will develop information systems which integrate AIS information system and automatic ship detection system.

Thank you for your attention !

